OPERATION & MAINTENANCE

HANDBOOK

MODEL 115

PULSE GENERATOR

Part Number 37001-228

S/N 35022

DATAPULSE DIVISION

SYSTRON DONNER CORPORATION

10150 W. JEFFERSON BLVD., CULVER CITY, CALIFORNIA 90230

FIRST EDITION

First Printing — April 1972

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Advance Specifications

MODEL 115 PULSE GENERATOR

* *rep rates to 50 MHz*
* *simultaneous positive and negative outputs*
* *rise/fall times<3.5 ns*
* *50 ohm back terminated*
* *variable DC offset*
* *variable delay and width to 1 sec*
* *square wave outputs*
* *external drive and double pulse capability*
* *synchronous and asynchronous gating*
* *clean pulses from 200 mV to 5 V into 50 ohm load*

The Model 115 Pulse Generator brings you the outstanding performance, dependability and uncompromising quality long associated with Datapulse test instruments. For a modest investment of $600.00 you can utilize rep rates to 50 MHz, variable baseline offset and many more useful features. Call your Scientific Devices man (or if overseas, your nearest Systron-Donner representative) today and ask for a demonstration.

SPECIFICATIONS

REPETITION RATE
Internal— < 1 Hz to >50 MHz in 8 decade ranges (25 MHz max. in double pulse mode).
External—DC to 50 MHz. Trigger signal must be at least ±0.8 V into 50 ohms and 7 ns wide. Max. trigger amplitude is ±5 V.
Manual—One pulse is generated each time the front panel single cycle pushbutton is depressed.

PULSE DELAY & WIDTH — Variable from <10 ns to >1 sec in 8 decade ranges. Variable over 75% of pulse period at 1 Hz to 10 MHz rep rates, decreasing to 50% at 10 MHz to 50 MHz rep rates.

SQUARE WAVE OUTPUT — Variable from 0.5 Hz to 25 MHz. Duty cycle is 50% ±1% below 1 MHz and ±15% above 1 MHz.

RISE/FALL TIME—Fixed at < 3.5 ns.

BASELINE OFFSET—Variable from -5 V to +1 V (-10 to +2 open circuit) with positive pulse out, or +5 to -1 V (+10 to -2 open circuit) with negative pulse out when terminated in 50 ohms. Levels are independent of pulse amplitude setting. Max. output levels are ±10 V.

PULSE POLARITY—Positive and negative pulse outputs are simultaneously available.

AMPLITUDE—Variable from < 200 mV to >5 V into 50 ohms or<400 mV to >10 V open circuit in 4 ranges.

ABERRATIONS—Overshoot, undershoot and top slope are<±5% of amplitude, when terminated in 50 ohms.

JITTER—Rep rate, delay and width jitter is less than 0.1% of setting or 50 picoseconds whichever is greater.

OUTPUT PROTECTION — Protected against short/open circuits or back voltages up to ±10 volts. Output stages cannot be damaged by any combination of front panel control settings.

EXTERNAL DRIVE INPUT—The output pulse width is determined by the width of the drive input. Amplitude and baseline may be varied. External drive must be >1 V into 50 ohms and >7 ns wide.

MODES OF OPERATION

GATED—Output pulses occur only for duration of an externally applied gate signal of +1 V into 50 ohms. Max. gate signal amplitude is ±5 V.

SYNCHRONOUS GATING—Rep rate oscillator is activated by the gate signal and the output duration coincides with the gate signal duration.

ASYNCHRONOUS GATING—Trigger to pulse forming circuits are blocked between gate signals while rep rate oscillator operates continuously. Output duration coincides with gate signal duration.

DOUBLE PULSE MODE—Two essentially identical pulses per rep rate period are generated. First pulse coincides with the sync output; second pulse occurs at the set delay time.

NORMAL/COMPLEMENT MODE — Front panel switch simultaneously inverts output by interchanging the baseline and pulse top levels.

MISCELLANEOUS

POWER REQUIRED—85 W max. at 105—125/210—230 V ac and 50—400 Hz.

OPERATING TEMPERATURE—0° to 50° C.

DIMENSIONS—16¾" W x 3½" H x 14-5/8" D.

SHIPPING WEIGHT—Approximately 17 pounds.

FINISH — Brushed aluminum front panel with black markings.

ACCESSORIES FURNISHED — One 8-foot power cord and one operation and maintenance handbook.

ACCESSORIES AVAILABLE—Type 2003A, 50 ohm, 25 watt Power Termination. Type 1010 Rack Mounting set. Extra copies of operation and maintenance handbook.

DOMESTIC LIST PRICE—$600.00 f.o.b. Culver City.

DATA SUBJECT TO CHANGE WITHOUT NOTICE

10 M 8/71

DATAPULSE DIVISION, SYSTRON-DONNER CORPORATION
10150 W. JEFFERSON BLVD., CULVER CITY, CALIFORNIA 90230 • Phone: (213) 871-0410 • TWX: 910-340-6766

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IMPORTANT! SEE ADDENDA FOR CHANGES TO THIS SECTION.

SECTION II

CONTROLS AND CONNECTORS

Refer to Figure 2-1 for the following explanation.

2.1 POWER

Applies ac power to the primary of the power transformer and illuminates the pilot lamp.

2.2 REPETITION RATE Controls

The rotary switch selects the repetition rate range or external triggering and the vernier provides continuous control within the range selected. In the EXT TRIG position the repetition rate oscillator is disabled and the instrument can be triggered by an external trigger source at the EXT INPUT connector or by the SINGLE CYCLE pushbutton when the external input polarity switch is in the positive position.

2.3 DELAY Controls

The rotary switch selects the delay range or external drive and the vernier provides continuous control within the delay range. In the EXT DRIVE position, the instrument can be triggered by an external drive source at the EXT INPUT connector. The width of the output pulse is determined by the width of the external drive signal, while the amplitude and baseline are variable by the front panel controls.

2.4 WIDTH Controls

The rotary switch selects the width range or square wave and the vernier provides continuous control within the width range. In the SQ WAVE position the output pulse has a 50% duty cycle (see specifications).

2.5 POSITIVE and NEGATIVE OUTPUT (volts into 50 ohms) Controls

The pushbuttons select the output voltage range and the vernier provides continuous control within the range selected.

2.5.1 Positive and Negative Baseline Control

Positive baseline control provides continuous adjustment of the dc level at the positive output from -5 to +1 V into 50 ohms (-10 to +2 V open circuited).

Negative baseline control provides continuous adjustment of the dc level at the negative output from +5 to -1 V into 50 ohms (+10 to -2 V open circuited).

Levels are independent of pulse amplitude setting. Maximum output levels are ±10 V.

2.5.1.1 Positive and Negative Baseline Switch

In the VAR position, the output pulse dc level can be varied by the BASELINE control. In the GRD position the baseline is at ground.

2.6 GATE MODE Switch

Determines whether output is continuous or can be gated by an external signal.

NON-GATED Position

Output pulse occurs continuously.

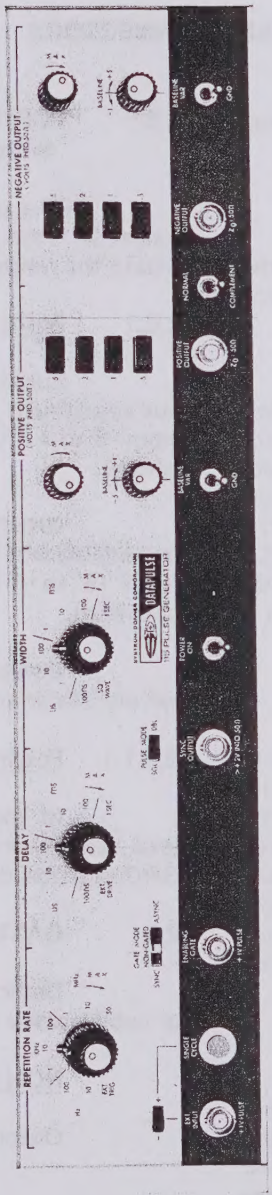


Figure 2-1. Model 115 Controls and Connectors

SYNC Position

Output pulse occurs only for the duration of a signal applied at the ENABLING GATE input. The output is synchronized to the gate signal. Sync output occurs only during the gate signal.

ASYNC Position

Output pulse occurs only for the duration of a signal applied at the ENABLING GATE input. The output is not synchronized to the gate signal. Sync output is continuous and not affected by the gate signal.

2.7 PULSE MODE Switch

SGL Position

One pulse per repetition rate period is generated at the output.

DBL Position

Two pulses per repetition rate period are generated at the output. The first pulse is coincident with the sync output and the second occurs at the set delay time.

2.8 NORMAL/COMPLEMENT Switch

NORMAL Position

Output pulse polarity corresponds to the nomenclature above the output connector.

COMPLEMENT Position

Baseline and pulse top levels are simultaneously interchanged.

2.9 EXT INPUT Connector

Input connector for the external trigger and external drive signals.

2.10 ENABLING GATE Connector

Input connector for the gate signal.

2.11 SYNC OUTPUT Connector

Output connector for the sync pulse.

2.12 POSITIVE and NEGATIVE OUTPUT Connectors

Output connectors for the main pulses.

2.13 115/230 Line Voltage Selector (Back Panel)

Selects the transformer primary configuration for either 115 or 230 V input.

IMPORTANT! SEE ADDENDA FOR CHANGES TO THIS SECTION.

SECTION III

OPERATION

3.1 FUNCTIONAL VERIFICATION

The following procedure provides a brief operational check of the instrument and an introduction to its controls.

3.1.1 Equipment (or equivalent) Required

a. A dual-trace, real-time oscilloscope with a 50 MHz bandpass. Tektronix Type 546 with a 1A2 plug-in recommended.

b. A dual-trace sampling oscilloscope with a 0.4 ns rise time. Tektronix Type 561A with a 3S1 plug-in recommended.

c. An electronic counter with a 50 MHz capability. Systron-Donner Model 1013 recommended.

d. Trigger and gate source with a 50 MHz repetition rate, variable width and variable amplitude and a bi-polar output. Datapulse Model 112 Pulse Generator recommended.

e. Two 50 ohm, 10X attenuators. Datapulse Type 1015 recommended.

f. Two 50 ohm, 2 W termination. Datapulse Type 2010 recommended.

g. Three 50 ohm coaxial cables terminated with BNC connectors. Datapulse Type 4048 recommended.

3.1.2 Output Check

a. Monitor the POSITIVE OUTPUT with the real-time oscilloscope. Trigger the oscilloscope from the SYNC OUTPUT. Terminate both outputs with 50 ohm, 2 W terminations at the oscilloscope.

b. Set the instrument controls as follows:

Control	Setting
REPETITION RATE selector	1 MHz
REPETITION RATE vernier	fully clockwise
DELAY selector	100 ns
DELAY vernier	fully counterclockwise
WIDTH selector	1 μs
WIDTH vernier	mid-range
POSITIVE OUTPUT pushbuttons	5 V depressed
POSITIVE OUTPUT vernier	fully clockwise
POSITIVE BASELINE vernier	index line
POSITIVE BASELINE switch	VAR
NEGATIVE OUTPUT pushbuttons	5 V depressed
NEGATIVE OUTPUT vernier	fully clockwise
NEGATIVE BASELINE vernier	index line
NEGATIVE BASELINE switch	VAR

Control	Setting
GATE MODE selector	NON-GATED
PULSE MODE selector	SGL
NORMAL/COMPLEMENT switch	NORMAL
POWER switch	off (down)

CAUTION

Verify that the position of the 115/230 V selector on the back panel agrees with the line voltage before connecting the power plug.

c. Set the POWER switch to the ON position.

d. Verify that pulses with a repetition rate of approximately 1 MHz, width of 500 ns and an amplitude of +5 V are displayed on the oscilloscope.

e. Set the NORMAL/COMPLEMENT switch to COMPLEMENT and verify that the pulses are inverted. Set the NORMAL/COMPLEMENT switch to NORMAL.

f. Turn the POSITIVE OUTPUT vernier counterclockwise and verify that the amplitude decreases.

g. Turn the POSITIVE BASELINE vernier clockwise and verify that the pulse baseline moves in a positive direction. Turn the BASELINE vernier counterclockwise and verify that the pulse baseline moves in a negative direction.

h. Set the POSITIVE BASELINE switch to GRD and verify that the pulse baseline is 0 volts. Turn the POSITIVE OUTPUT vernier fully clockwise.

i. Monitor the NEGATIVE OUTPUT with the real-time oscilloscope and verify that a negative pulse (-5 V amplitude) similar to the positive pulse in step (d) are displayed.

j. Perform steps (e) through (h) for the NEGATIVE OUTPUT and BASELINE controls. Verify that the baseline moves in a positive direction when the baseline control is turned clockwise.

k. Turn the WIDTH vernier counterclockwise and verify that the pulse width decreases.

l. Turn the DELAY vernier clockwise and verify that the delay time increases (pulse moves to the right).

m. Turn the WIDTH vernier fully counterclockwise. Set the DELAY selector to 1 μs and the DELAY vernier to mid-range.

n. Set the PULSE MODE selector to DBL and verify that two pulses per repetition rate period are displayed on the oscilloscope. Turn the DELAY vernier counterclockwise and verify that the second pulse moves to the left.

o. Set the PULSE MODE selector to SGL.

p. For a full range check of repetition rate, delay, width and output amplitude, perform Tables 3-1 through 3-3. Use the counter to check repetition rate. Use the sampling oscilloscope to check the 100 ns delay and width ranges. Use the real-time oscilloscope for all other ranges. Observe the delay and width duty cycle limitations listed in the specifications when making all checks.

Table 3-1. Repetition Rate Check

Repetition Rate Range	Counter Indication	
	Vernier CCW	Vernier CW
10 Hz	<1 Hz	>10 Hz
100 Hz	<10 Hz	>100 Hz
1 kHz	<100 Hz	>1 kHz
10 kHz	<1 kHz	>10 kHz
100 kHz	<10 kHz	>100 kHz
1 MHz	<100 kHz	>1 MHz
10 MHz	<1 MHz	>10 MHz
50 MHz	<10 MHz	>50 MHz

Table 3-2. Delay/Width Check

Repetition Rate Range	Delay/Width Range	Oscilloscope Indication	
		Vernier CCW	Vernier CW
5 MHz	100 ns	<10 ns	>100 ns
500 kHz	1 μs	<100 ns	>1 μs
50 kHz	10 μs	<1 μs	>10 μs
5 kHz	100 μs	<10 μs	>100 μs
500 Hz	1 ms	<100 μs	>1 ms
50 Hz	10 ms	<1 ms	>10 ms
5 Hz	100 ms	<10 ms	>100 ms
see note	1 sec	<100 ms	>1 sec

NOTE: Use 5 Hz repetition rate to check the low end of the range (100—500 ms). Use single cycle mode to check range above 0.5 seconds.

Table 3-3. Output Amplitude Check

Output Range	Oscilloscope Indication	
	Vernier CCW	Vernier CW
+5 V	<+2 V	>+5 V
+2 V	<+1 V	>+2 V
+1 V	<+0.5 V	>+1 V
+0.5 V	<+200 mV	>+0.5 V
-5 V	>-2 V	<-5 V
-2 V	>-1 V	<-2 V
-1 V	>-0.5 V	<-1 V
-0.5 V	>-200 mV	<-0.5 V

NOTE: Set the delay and width to minimum (10 ns) when performing Table 3-1.

3.1.3 External Trigger/Drive Check

a. Set the instrument controls as follows:

Control	Setting
REPETITION RATE selector	EXT TRIG
EXT INPUT Polarity switch	+
DELAY selector	100 ns
DELAY vernier	fully counterclockwise
WIDTH selector	100 ns
WIDTH vernier	fully counterclockwise
POSITIVE OUTPUT pushbuttons	5 V depressed
POSITIVE OUTPUT vernier	fully clockwise
POSITIVE BASELINE switch	GRD
GATE MODE selector	NON-GATED
NORMAL/COMPLEMENT switch	NORMAL
POLARITY switch	POSITIVE

b. Connect the external trigger source to the EXT INPUT. Set the source for 100 kHz repetition rate and +1 V amplitude into 50 ohms.

c. Monitor the POSITIVE OUTPUT connector with the real-time oscilloscope. Trigger the oscilloscope from the sync output of the trigger source.

d. Verify that the instrument is triggered and can be triggered from 1 Hz to 50 MHz.

e. Set the EXT INPUT polarity switch to - and verify that the instrument is no longer triggered. Switch the external trigger source to a -1 V output and verify that the instrument is again triggered.

f. Set the external trigger source for 100 kHz repetition rate, +1 volt amplitude and 5μs width.

g. Set the instrument controls the same as in step (a) except set the DELAY selector to EXT DRIVE.

h. Verify that the output pulse has a repetition rate of 100 kHz, a width of 5μs and an amplitude of +5 V. Verify that the amplitude and baseline of the output pulse can be varied.

3.1.4 Single Cycle Check

a. Establish the test set-up the same as in paragraph 3.2 step (a). Set the instrument controls the same as in paragraph 3.2 step (b) except set the REPETITION RATE selector to EXT TRIG, the EXT INPUT polarity switch to +, the DELAY and WIDTH controls to 0.1 S.

b. Depress the SINGLE CYCLE pushbutton and verify that one pulse appears momentarily on the trace.

IMPORTANT! SEE ADDENDA FOR CHANGES TO THIS SECTION.

SECTION IV

CALIBRATION

4.1 EQUIPMENT (or equivalent) REQUIRED

a. A dual-trace, real-time oscilloscope with a 50 MHz bandpass. Tektronix Type 546 with a Type 1A2 plug-in recommended.

b. A dual-trace sampling oscilloscope with a 0.4 ns rise time. Tektronix Type 561A with a Type 3S1 plug-in recommended.

c. An electronic counter capable of reading 50 MHz. Systron-Donner Model 1013 recommended.

d. A digital voltmeter capable of reading units of millivolts. Systron-Donner Model 7015 recommended.

e. Three 50 ohm, 2 watt coaxial terminations. Datapulse Type 2010 recommended.

f. Three 50 ohm, 10X, 2 watt attenuators. Datapulse Type 2015 recommended.

g. Three 50 ohm coaxial cables terminated with BNC connectors.

4.2 POWER SUPPLY CALIBRATION

a. Connect the instrument to the 115 V supply and set the POWER switch to ON. Set the REPETITION RATE selector to EXT TRIG.

b. Monitor the +15 V buss with the digital voltmeter and adjust R529 for 15.00 volts.

c. Monitor the -15 V buss with the digital voltmeter and verify a reading of -15.00 ±0.3 V.

d. Monitor the +5 V buss and verify a reading of +5.00 ±0.2 V.

4.3 OSCILLATOR CALIBRATION

a. Set the instrument controls as follows:

Control	Setting
REPETITION RATE selector	50 MHz
REPETITION RATE vernier	fully clockwise
DELAY selector	100 ns
DELAY vernier	fully counterclockwise
WIDTH selector	100 ns
WIDTH vernier	fully counterclockwise
POSITIVE OUTPUT pushbuttons	5 V depressed
POSITIVE OUTPUT vernier	fully clockwise
POSITIVE BASELINE switch	GRD
GATE MODE selector	NON-GATED
PULSE MODE selector	SGL
NORMAL/COMPLEMENT switch	NORMAL

b. Monitor the POSITIVE OUTPUT with the counter. Terminate the POSITIVE OUTPUT with the 50 ohm, 2 watt termination at the counter input.

c. Adjust C75 for a counter indication of greater than 50 MHz.

d. Rotate the REPETITION RATE vernier fully clockwise and verify that the counter reading is less than 50 MHz.

e. Check the remaining repetition rate ranges for overlap at the upper and lower limits.

NOTE: Check the timing capacitors, C77 through C83, if it is not possible to get overlap on all ranges.

4.4 DELAY CALIBRATION

a. Set the instrument controls as follows:

Control	Setting
REPETITION RATE selector	1 MHz
REPETITION RATE vernier	fully clockwise
DELAY selector	100 ns
DELAY vernier	fully clockwise
WIDTH selector	100 ns
WIDTH vernier	fully counterclockwise
POSITIVE OUTPUT pushbuttons	5 V depressed
POSITIVE OUTPUT vernier	fully clockwise
POSITIVE BASELINE switch	GRD
GATE MODE selector	NON-GATED
PULSE MODE selector	SGL
NORMAL/COMPLEMENT switch	NORMAL

b. Monitor the POSITIVE OUTPUT and the SYNC OUTPUT on the dual-trace sampling oscilloscope. Trigger the oscilloscope from the SYNC OUTPUT. Attenuate all three outputs with the 50 ohm, 10X attenuator at the oscilloscope. Set the oscilloscope control to display a single pulse on each trace.

c. Adjust C143 for approximately 105 ns delay between the leading edge of the sync output pulse and the leading edge of the output pulse.

d. Rotate the DELAY vernier fully counterclockwise and verify that the delay (period between the leading edge of the sync pulse and the leading edge of the output pulse) is less than 10 ns.

e. Check the remaining delay ranges for overlap at the upper and lower limits. Use the sampling oscilloscope to check the 100 ns and 1 μs ranges. Use the real-time oscilloscope to check the remaining ranges. Terminate all three outputs with the 50 ohm, 2 watt termination when using the real-time oscilloscope.

NOTE: If it is not possible to get overlap on all ranges, check the timing capacitors (C144 through C150).

4.5 WIDTH CALIBRATION

a. Set the instrument controls as follows:

Control	Setting
REPETITION RATE selector	1 MHz
REPETITION RATE vernier	fully clockwise
DELAY selector	100 ns
DELAY vernier	fully counterclockwise
WIDTH selector	100 ns

Control	Setting
WIDTH vernier	fully clockwise
POSITIVE OUTPUT pushbuttons	5 V depressed
POSITIVE OUTPUT vernier	fully clockwise
POSITIVE BASELINE switch	GRD
GATE MODE selector	NON-GATED
PULSE MODE selector	SGL
NORMAL/COMPLEMENT switch	NORMAL

b. Monitor the POSITIVE OUTPUT with the sampling oscilloscope. Trigger the oscilloscope from the SYNC OUTPUT. Terminate both outputs with the 50 ohm, 10X attenuators. Set the oscilloscope controls to display a single pulse on the trace.

c. Adjust C172 for a pulse width of approximately 105 ns.

d. Rotate the WIDTH vernier fully counterclockwise and verify that the pulse width is less than 10 ns.

e. Check the remaining width ranges for overlap at the upper and lower limits. Use the sampling oscilloscope to check the 100 ns and 1 μs ranges. Use the real-time oscilloscope to check the other ranges. Terminate the outputs with the 50 ohm, 2 watt termination when using the real-time oscilloscope.

NOTE: If it is not possible to get overlap on all ranges, check the timing capacitors (C173 through C179).

4.6 OUTPUT AMPLIFIER CALIBRATION

a. Set the instrument controls as follows:

Control	Setting
REPETITION RATE selector	1 MHz
REPETITION RATE vernier	fully clockwise
DELAY selector	100 ns
DELAY vernier	fully counterclockwise
WIDTH selector	1 μs
WIDTH vernier	mid-range
POSITIVE OUTPUT pushbuttons	5 V depressed
POSITIVE OUTPUT vernier	fully clockwise
POSITIVE BASELINE switch	GRD
NEGATIVE OUTPUT pushbuttons	5 V depressed
NEGATIVE OUTPUT vernier	fully clockwise
NEGATIVE BASELINE switch	GRD
GATE MODE selector	NON-GATED
PULSE MODE selector	SGL
NORMAL/COMPLEMENT switch	NORMAL

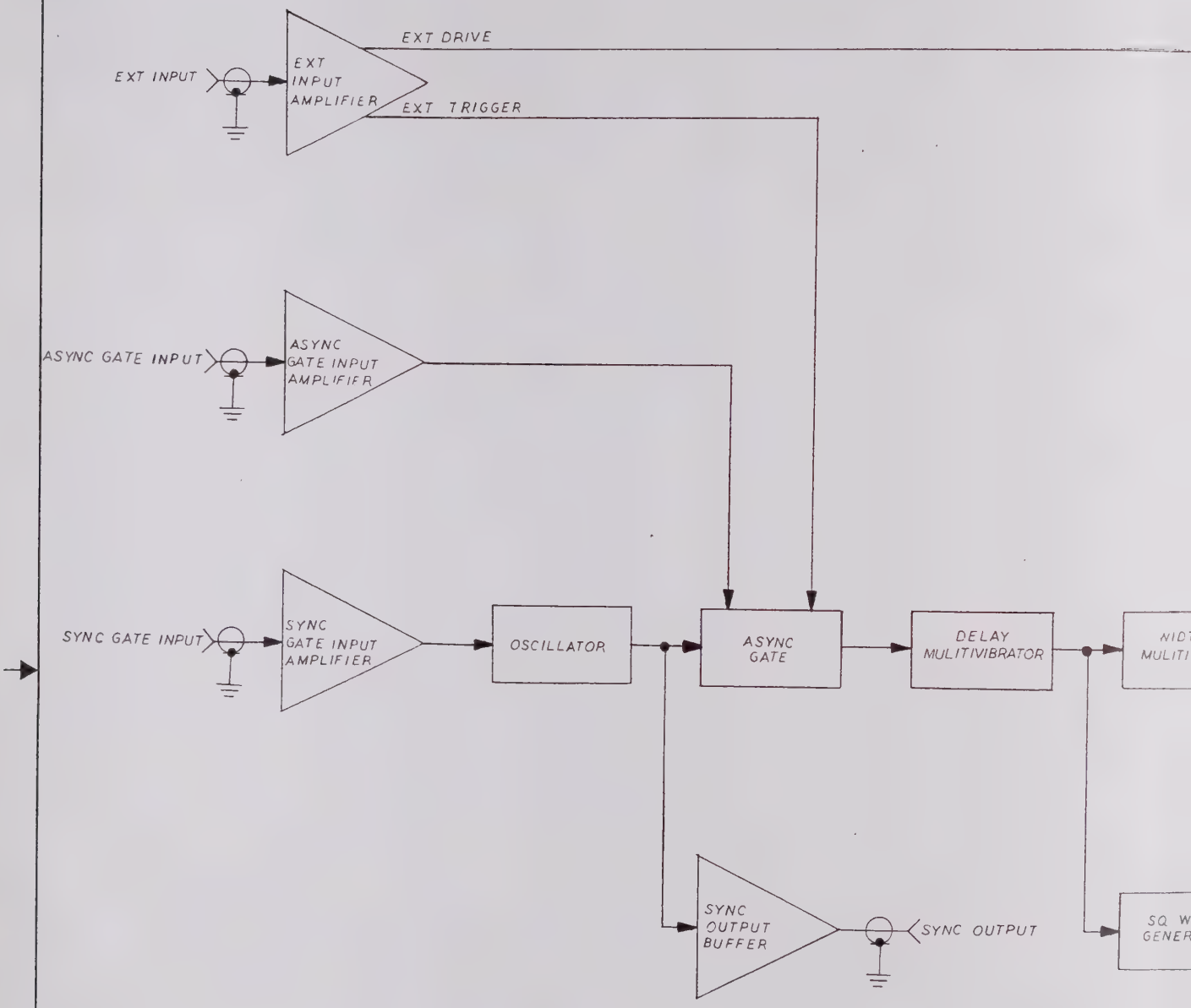
b. Monitor the POSITIVE OUTPUT with the real-time oscilloscope. Trigger the oscilloscope from the SYNC OUTPUT. Terminate both outputs with 50 ohm terminations at the oscilloscope inputs. Set the oscilloscope controls to display a single pulse on the trace.

c. Adjust R359 for a pulse amplitude of approximately 5.25 volts.

d. Monitor the NEGATIVE OUTPUT with the oscilloscope. Terminate the output with the 50 ohm termination at the oscilloscope input.

e. Adjust R419 for a pulse amplitude of approximately -5.25 volts.

f. Adjust R317 for a baseline of 0 volts.



NOTE: UNLESS OTHERWISE SPECIFIED

REVISIONS			
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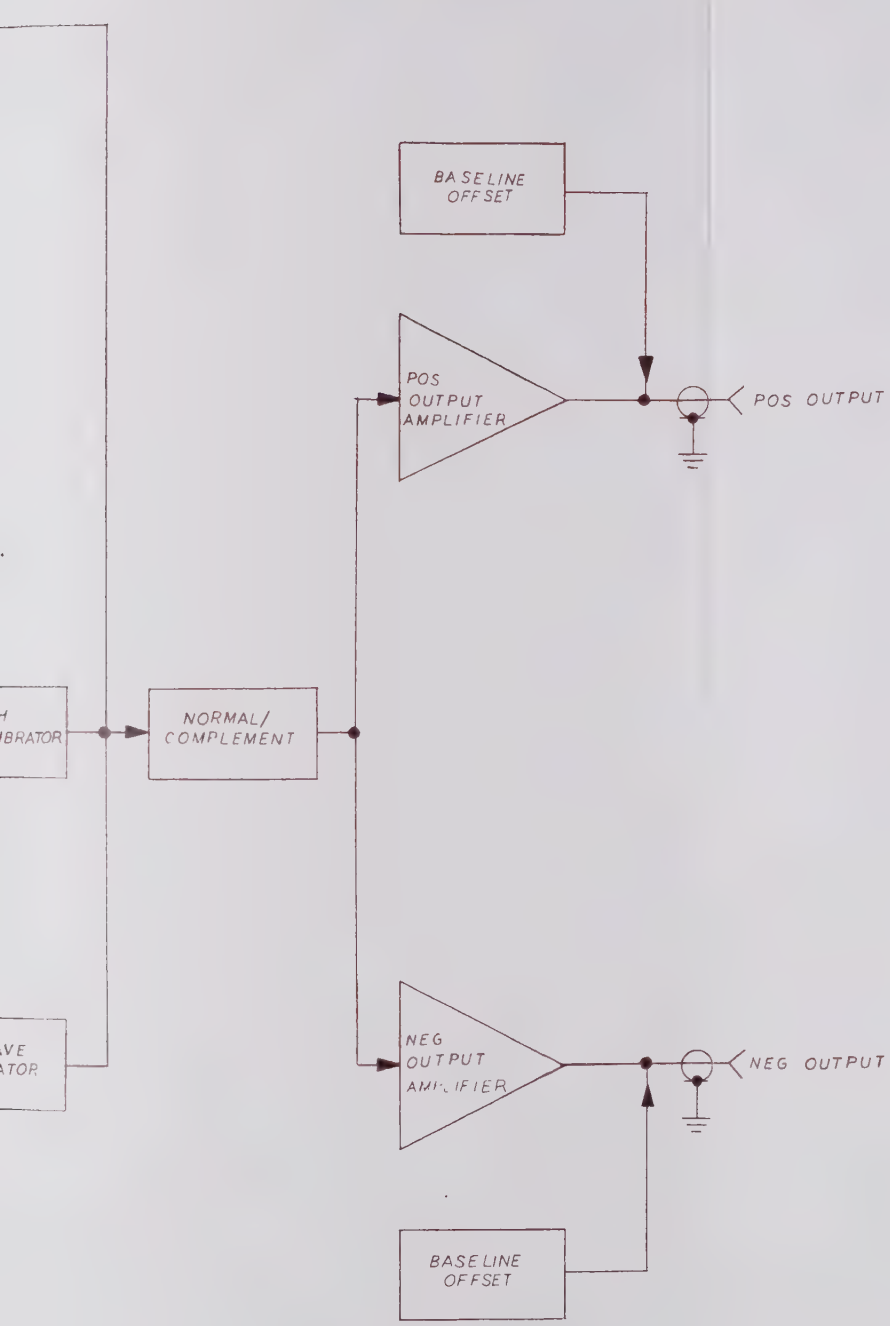


	M115		
NEXT ASSY	USED ON	NEXT ASSY	FINAL ASSY
APPLICATION		QTY REQD	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
3 PLACE DEC. ± — | 2 PLACE DEC. ± — | ANGLES ± —
MATERIAL
FINISH
DO NOT SCALE DWG.

DRAWN		7/9/71
CHECKED		9 Aug 71
APPROVED		
APPROVED		
APPROVED		
RELEASED	E.O. 9029	8/9/71

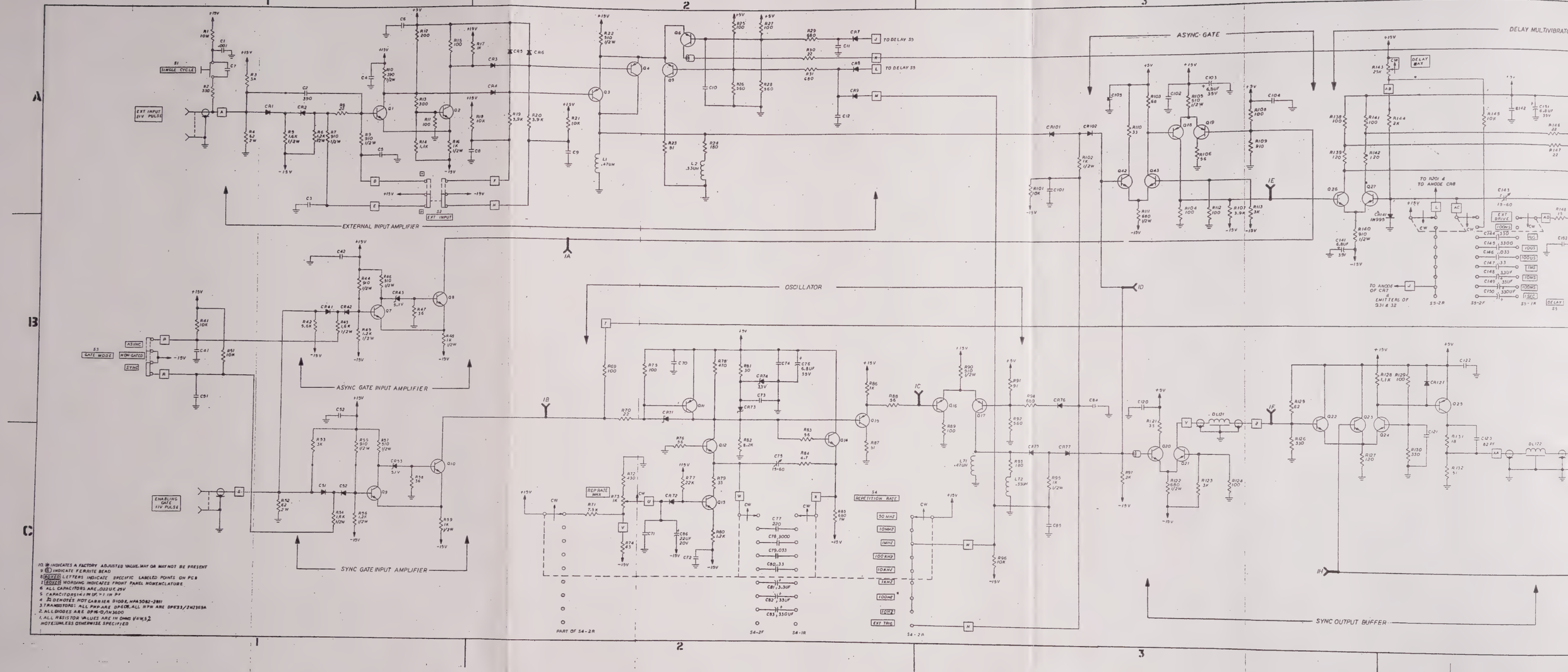
TITLE: BLOCK DIAGRAM — MODEL 115

SCALE NONE | CODE 15933

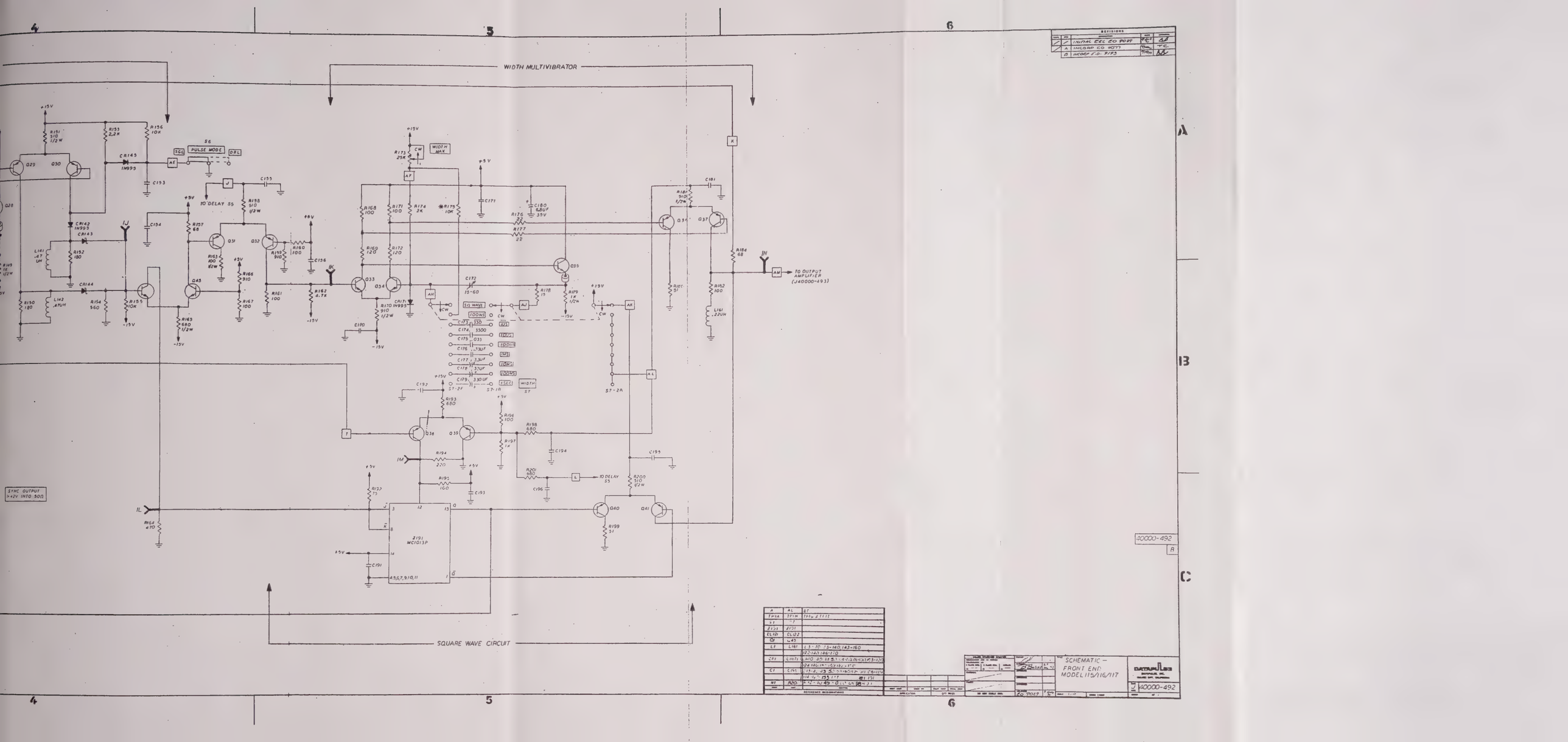
SYSTRON-DONNER CORPORATION
DATAPULSE
CULVER CITY, CALIFORNIA

DWG SIZE D | 41000 259

SHEET 1 OF 1



10. ⊛ INDICATES A FACTORY ADJUSTED VALUE. MAY OR MAY NOT BE PRESENT
9. (E) INDICATE FERRITE BEAD
8. BOXED LETTERS INDICATE SPECIFIC LABELED POINTS ON PCB
7. BOXED WORDING INDICATES FRONT PANEL NOMENCLATURE
6. ALL CAPACITORS ARE .022UF, 25V
5. CAPACITORS ≤ 1 IN UF, > 1 IN PF
4. ⊠ DENOTES HOT CARRIER DIODE, HPA3082-2811
3. TRANSISTORS: ALL PNP ARE DPE31/2N2369A
2. ALL DIODES ARE DPE4-0/1N3600
1. ALL RESISTOR VALUES ARE IN OHMS (Ω), ¼ W
NOTE: UNLESS OTHERWISE SPECIFIED


WIDTH MULTIVIBRATOR
SQUARE WAVE CIRCUIT
SYNC OUTPUT
>+2V INTO 50Ω
TO DELAY 55
TO OUTPUT AMPLIFIER (J40000-493)
S6
PULSE MODE
SEQ
DBL
AE
WIDTH MAX
CW
10 WAVE
100NS
1US
10US
100US
1MS
10MS
100MS
1SEC
WIDTH S7
S7-2A
S7-2F
S7-1B
J191 MC1013P
REVISIONS
INITIAL ECL CO 9099
INCORP CO 9077
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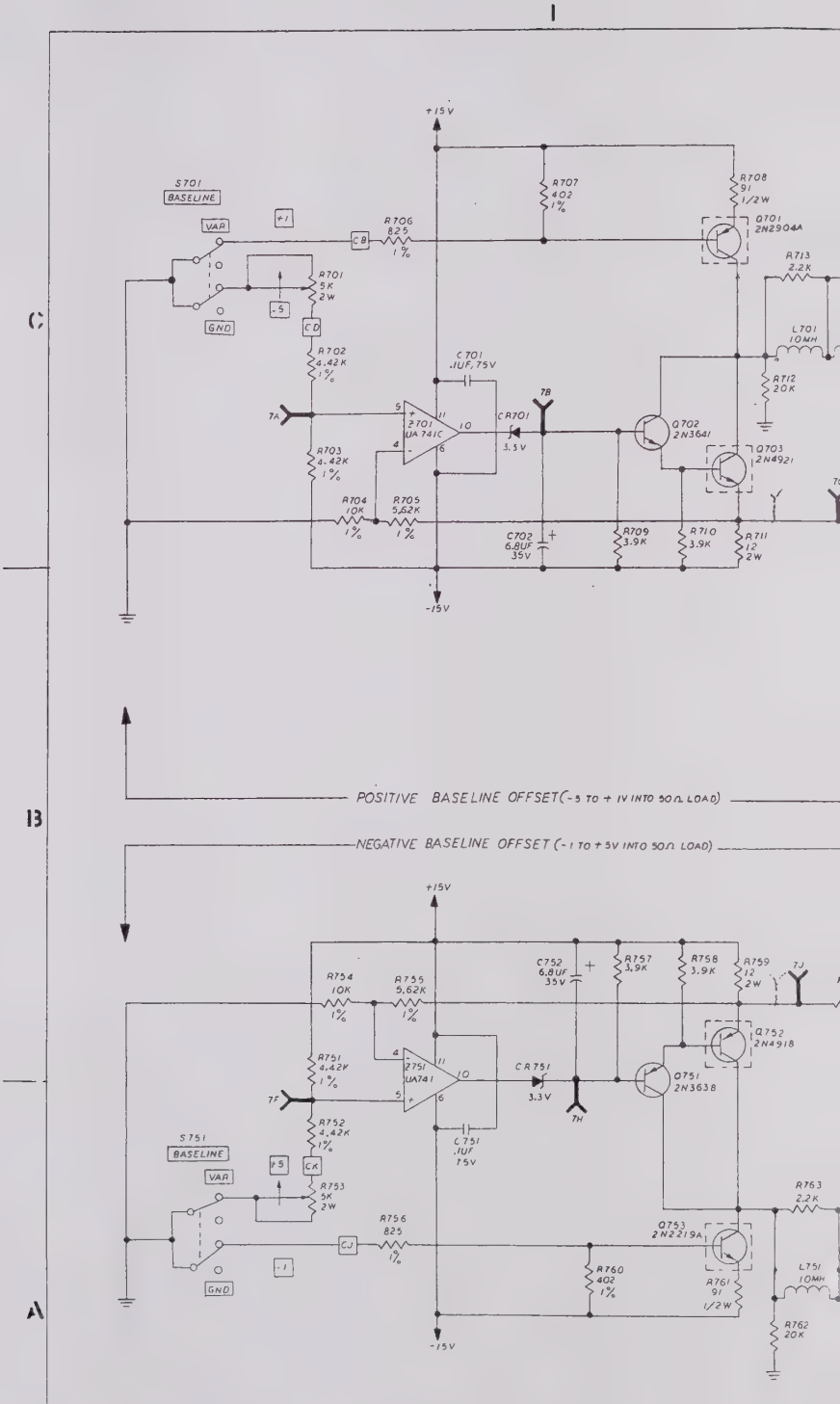
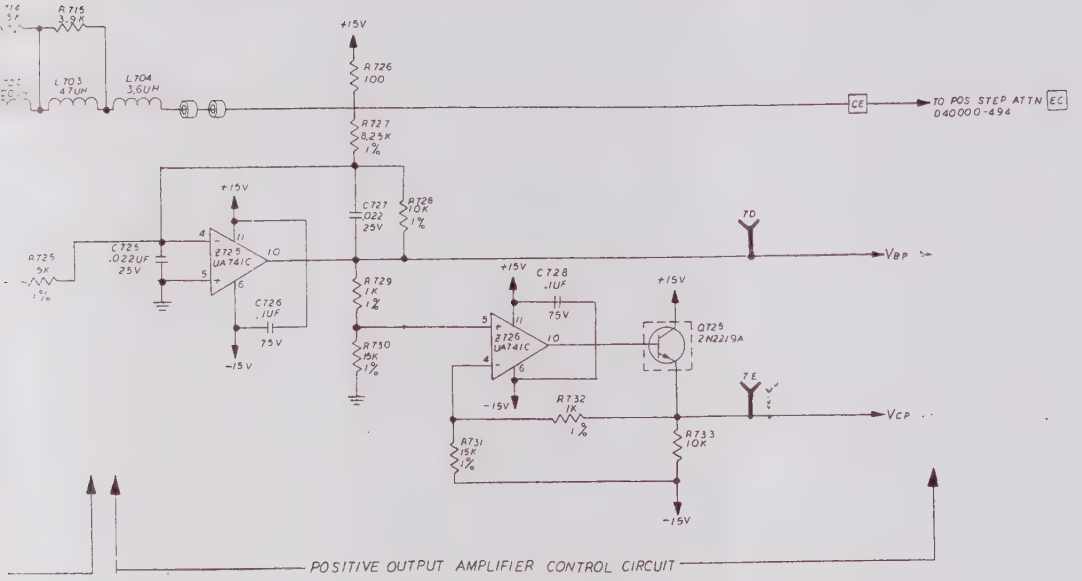
SCHEMATIC — FRONT END MODEL 115/116/117
DATAPULSE
J40000-492
A
B
C
4
5
6


+15V
S701
BASELINE
VAR
GND
+1
-5
CB
CD
R706
825
1%
R707
402
1%
R708
91
1/2W
Q701
2N2904A
R713
2.2K
L701
10MH
R712
20K
R701
5K
2W
R702
4.42K
1%
C701
.1UF, 75V
7A
7B
2701
UA741C
CR701
3.3V
Q702
2N3641
Q703
2N4921
R703
4.42K
1%
R704
10K
1%
R705
5.62K
1%
C702
6.8UF
35V
R709
3.9K
R710
3.9K
R711
12
2W
-15V
POSITIVE BASELINE OFFSET (-5 TO +1V INTO 50Ω LOAD)
NEGATIVE BASELINE OFFSET (-1 TO +5V INTO 50Ω LOAD)
+15V
R754
10K
1%
R755
5.62K
1%
C752
6.8UF
35V
R757
3.9K
R758
3.9K
R759
12
2W
7J
Q752
2N4918
R751
4.42K
1%
2751
UA741
CR751
3.3V
Q751
2N3638
7F
7H
R752
4.42K
1%
C751
.1UF
75V
S751
BASELINE
VAR
GND
+5
-1
CK
CJ
R753
5K
2W
R756
825
1%
R763
2.2K
Q753
2N2219A
L751
10MH
R760
402
1%
R761
91
1/2W
R762
20K
-15V
5-BOXED WORDING INDICATES FRONT PANEL NOMENCLATURE
4-BOXED LETTERS INDICATE SPECIFIC. LABELED POINTS ON PCB
3-( ) INDICATES FERRITE BEAD
2-DOTTED BOX AROUND TRANSISTOR INDICATES HEAT SINK
1-ALL RESISTORS ARE IN OHMS 1/4W 5%
NOTE: UNLESS OTHERWISE SPECIFIED.

REVISIONS			
LTR	DESCRIPTION	DATE	APPROVED
B	V. REVISED PER ECO 9222 INITIAL REL ECO 9222	30 MAY 75	AE



40000-495 B

S701	S751	S702 - 750
Z701	Z776	Z702 - 724, 727 - 750, 752 - 774
Q701	Q775	Q704 - 724, 726 - 750, 754 - 774
L701	L754	L705 - 750
CR701	CR751	CR702 - 750
C701	C778	C703 - 724, 729 - 750, 753 - 774
R701	R783	R716 - 724, 734 - 750, 766 - 774

REFERENCE DESIGNATIONS

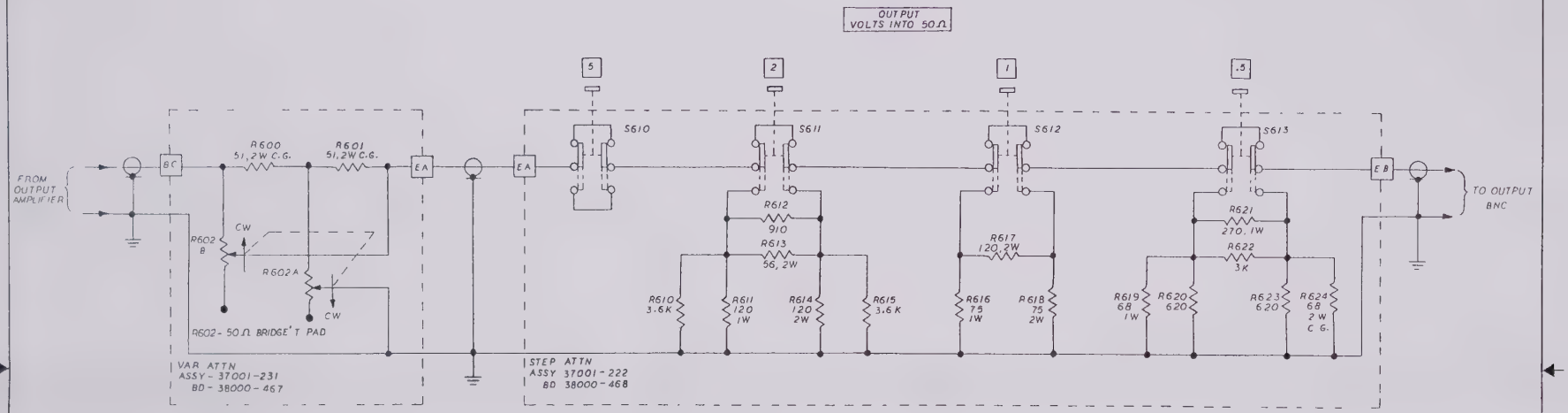
DO NOT SCALE DRWG. ECO 9222

SCHEMATIC - BASELINE OFFSET & CONTROL CIRCUITS MODEL 115

DATAPULSE INC. CULVER CITY, CALIFORNIA

SIZE D | 40000-495 | SHEET 1 OF 1

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
/	INITIAL RELEASE E.O. 9025	3 AUG 71	B Basich



40000-494

3- C.G. INDICATES CORNING GLASS
2- BOXED LETTERS INDICATE SPECIFIC LABELED POINTS ON PCB
1- ALL RESISTORS ARE IN OHMS 1/4W, 5%
NOTE: UNLESS OTHERWISE SPECIFIED

EA	EB	EC THRU EJ (BOXED LETTERS)
S610	S613	
R600	R624	R603 - 609
PART	LIST	QUANTITY

REFERENCE DESIGNATIONS

MFGR ASSY	USED ON	NEXT ASSY	FINAL ASSY
APPLICATION		QTY REQD	

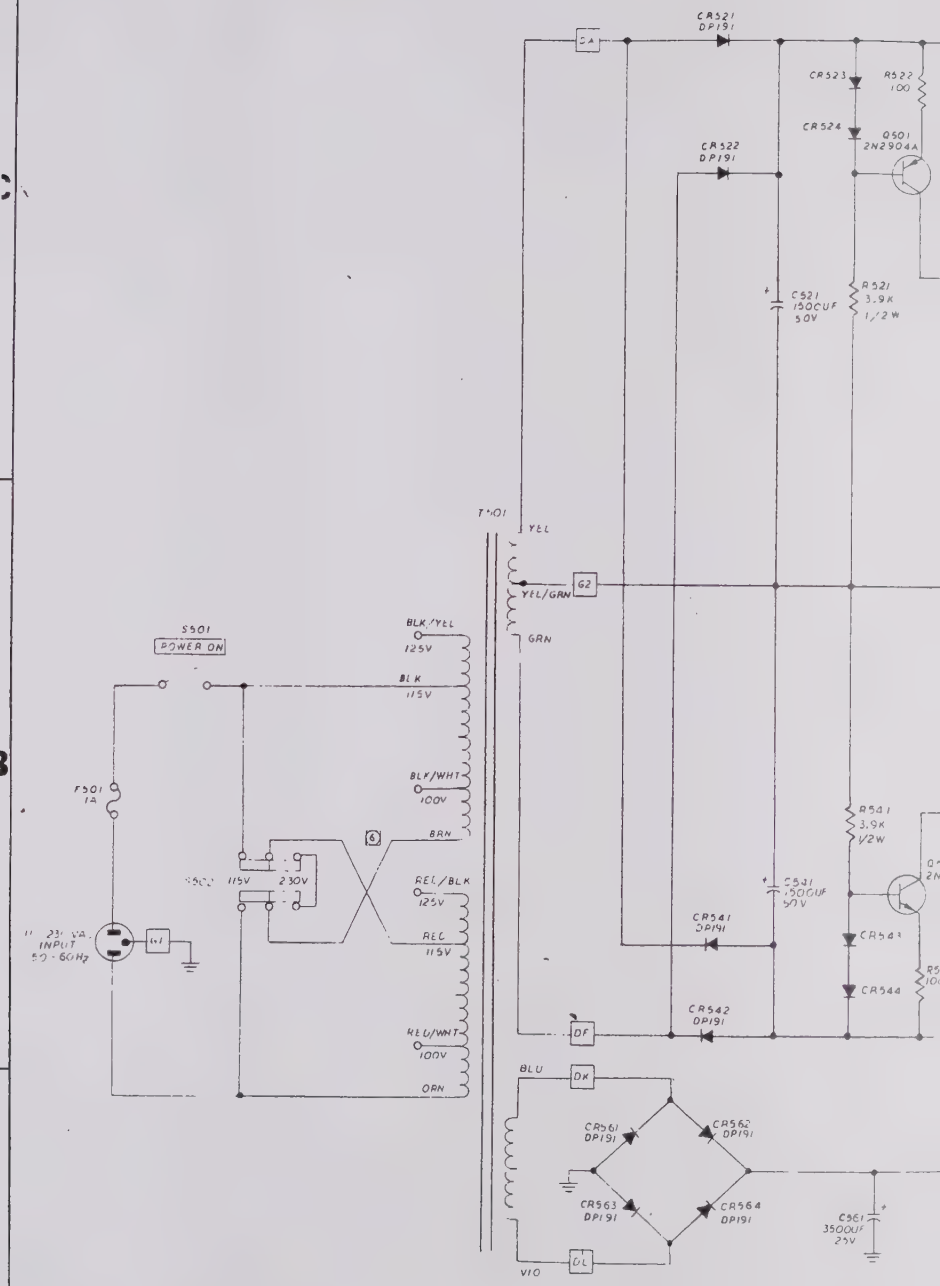
UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES; TOLERANCES ON: X PLACE DEC. ±, X PLACE DEC. ±, ANGLES ±; MATERIAL; FINISH; DO NOT SCALE DWG.

DRAWN R. Wilson 7/1/71
CHECKED B Basich 23 JUL 71
APPROVED
APPROVED
RELEASED E.O. 9025 3 AUG 71

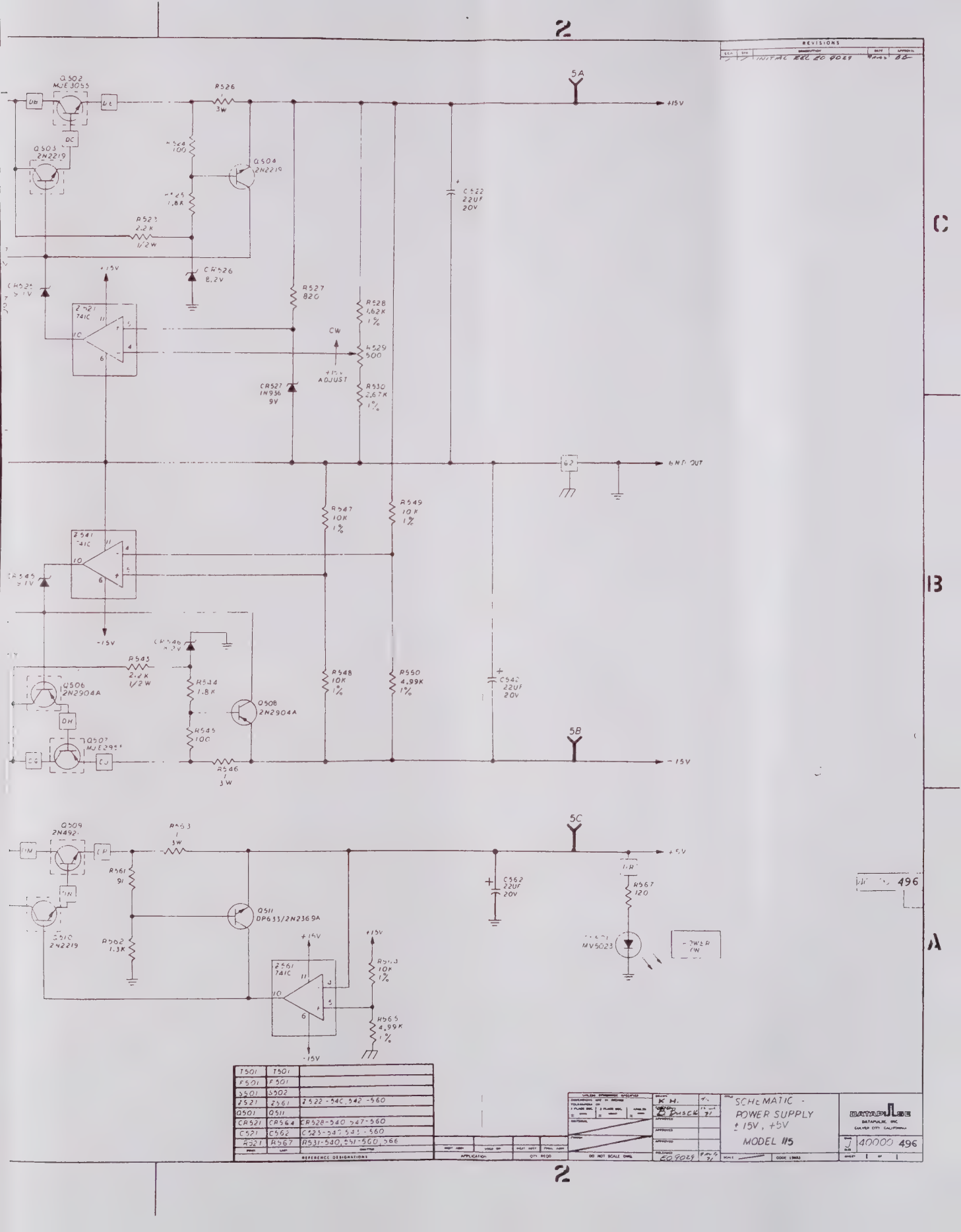
TITLE: SCHEMATIC - ATTENUATOR
SCALE NONE CODE 18853

SYSTRON-DONNER CORPORATION
DATAPULSE
CULVER CITY, CALIFORNIA

SIZE D 40000-494
SHEET 1 OF 1



1. T501 SHOWN CONNECTED FOR 115/230VAC OPERATION
2. FOR 115VAC OPERATION:
   REPLACE BLK WITH BLK/WHT
   REPLACE RED WITH RED/WHT
   FOR 230VAC OPERATION:
   REPLACE BLK WITH BLK/YEL
   REPLACE RED WITH RED/BLK
3. DOTTED BOX AROUND TRANSISTOR INDICATES HEATSINK
4. [- X -] INDICATES FRONT PANEL NOMENCLATURE
5. BOXED LETTERS INDICATES SPECIFIC LABLED POINTS ON CKT BOARD
6. ALL DIODES ARE IN4306 OR IN3600
7. ALL RESISTORS ARE IN OHMS 1/4W 5%
8. NPN UNLESS OTHERWISE SPECIFIED


REVISIONS
INITIAL REL 20 9029
Q502 MJE3055
R526 3W
+15V
5A
Q503 2N2219
R524 100
Q504 2N2219
R525 1.8K
R523 2.2K 1/2W
C522 22UF 20V
CR526 8.2V
CR524 9.1V
+15V
Z521 741C
R527 820
R528 1.62K 1%
CW
R529 500
+15V ADJUST
R530 2.67K 1%
CR527 IN936 9V
GND OUT
R547 10K 1%
R549 10K 1%
Z541 741C
CR545 9.1V
-15V
CR546 9.1V
R545 2.2K 1/2W
Q506 2N2904A
R544 1.8K
Q508 2N2904A
R548 10K 1%
R550 4.99K 1%
C542 22UF 20V
Q507 MJE2955
R545 100
5B
-15V
R546 1/3W
Q509 2N4922
R553 1 3W
5C
+5V
R561 91
Q511 DP633/2N2369A
Q510 2N2219
R562 1.3K
+15V
Z561 741C
R571 10K 1%
R565 4.99K 1%
-15V
C562 22UF 20V
R567 120
MV5023
POWER IN
T501 T501
F501 F501
S501 S502
Z521 Z561 Z522-540,542-560
Q501 Q511
CR521 CR564 CR528-540 547-560
C521 C562 C523-547 549-560
R521 R567 R531-540,551-560,568
REFERENCE DESIGNATIONS
APPLICATION
QTY REQD
DO NOT SCALE DWG.
DRAWN K.H.
CHECKED E. BUSCH
APPROVED
APPROVED
RELEASED E0 9029
SCHEMATIC - POWER SUPPLY ±15V, +5V MODEL 115
DATAPULSE INC. CULVER CITY, CALIFORNIA
J 40000 496
SHEET 1 OF 1
40000 496
A
B
C

E. O. NO.	EFFECTIVE DATE	DWG. NO.	CHANGE
3963	6-15-72	40000-493	Delete C305, 0.022 μF, 25 V capacitor, P/N11241-223; Draw asterisk on L345 and L346 (positive channel), 0.15 μH and L405 and L406 (negative channel), 0.15 μH, add note 9 for factory adjusted values. Change R335 from 750 ohm, ¼ W to 110 ohms, ¼ W and change R336 from 110 ohm, ¼ W to 750 ohm, ¼ W.
3972	6-26-72	Manual	Add to specifications: Sync pulse is $\geq$2.0 V into 50 ohms, width approximately 12 ns.
3951	6-3-72	40000-496	For 230 volt operation, change the current value of the fuse to the next size over ¾ the current value at 115 volt operation.
4020	7-17-72	40000-493	Change L301 from 0.82 μH, P/N14284-015 to 0.47 μH, P/N14284-014.

SEMICONDUCTOR REPLACEMENTS
(Applicable to all Datapulse Models except the Model 102).

SERVICE BULLETIN 1-65
Revised 2-19-70

The listed commercial equivalent diodes and transistors are suitable replacements for the corresponding Datapulse parts, either as direct substitues, or as selected for the special performance characteristics given.

DATAPULSE TYPE NO.	DATAPULSE PART NO.	COMMERCIAL EQUIVALENT
Diodes:		
DP15-0	22154-000	1N752A selected for $\Delta V < 0.2$ V between 7 mA and 110 mA.
DP15-1	22154-001	Same as DP15-0 but matched in pairs to within 0.1 V.
DP15-201	22154-201	1N936 selected for 9.4 V $\pm$0.1 V @25 mA.
DP16-0	22164-000	1N3600
DP16-1	22164-001	1N3604
DP16-2	22164-002	HPA1003
DP19-0	22194-000	1N2070/1N4005
DP19-1	22194-001	1N4002
DP19-6	22194-006	1N2071/1N4005
Transistors:		
DP43-0	22435-000	2N984
DP46-1	22465-001	Selected for h_{fe} = 100 min.
DP59-0	22595-000	2N1132
DP60-1	22605-001	2N2894 selected for V_{ceo} (sust) = 20 V min.
DP60-2	22605-002	2N3133
DP60-4	22605-004	2N3209
DP60-5	22605-005	FT1702
DP60-6	22605-006	2N3640
DP60-7	22605-007	2N2894 selected for V_{ceo} (sust) = 25 V.
DP63-2	22635-002	Replaced by DP63-3
DP63-3	22635-003	2N2369A (Fairchild)
DP63-4	22635-004	2N3646 or 2N2369A
DP63-6	22635-006	2N2270
DP63-7	22635-007	2N3261 selected for C_{OB} of 3.3 pF or less.
DP63-8	22635-008	May be replaced by 2N5109 selected for $h_{fe} \geq 20$ @I_c = 0.25 A & V_c = 2.5 V
DP63-9	22635-009	May be replaced by 2N5109 selected for $h_{fe} \geq 20$ @I_c = 0.25 A & V_c = 2.5 V
DP64-0	22645-000	May be replaced by 2N5109 selected for $h_{fe} \geq 20$ @I_c = 0.25 A & V_c = 2.5 V

WARRANTY

The Datapulse Division, Systron-Donner Corporation (hereinafter referred to as Datapulse) warrants each instrument of its manufacture to be free from defects in material and workmanship. Our obligation under this Warranty is limited to servicing or adjusting any instrument returned to our factory for that purpose, and to making good at our factory any part or parts thereof except tubes, transistors, fuses or batteries which shall, within one year after making delivery to the original purchaser, be returned to us with transportation charges prepaid, and which our examination shall disclose to our satisfaction to have been thus defective.

Instruments returned under this Warranty will not be accepted at the Datapulse plant without prior authorization by a Datapulse representative or by the service manager of Datapulse.

Datapulse reserves the right to make changes in design at any time without incurring any obligation to install same on units previously purchased.

This Warranty is expressly in lieu of all other obligations or liabilities on the part of Datapulse and Datapulse neither assumes nor authorizes any other person to assume for them any other liability in connection with the sales of Datapulse instruments.

MP MASTER
MA25808